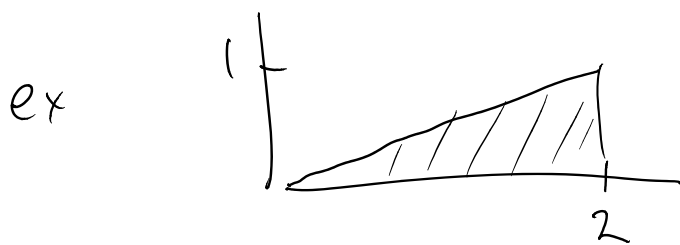


Integration Review

Recall:  $\int f(x) dx$  "indefinite integral"  
 represents general form of  
 an anti-derivative for  $f(x)$

$$\int x^2 dx = \frac{1}{3} x^3 + C$$

$\int_a^b f(x) dx$  "definite integral"  
 signed area between the graph of  $f(x)$   
 &  $x$ -axis between  $x=a$  &  $x=b$



$$f(x) = \frac{1}{2} x$$

$$\int_0^2 \frac{1}{2} x dx$$

— 1 1 1 1 ... 1 (1/2) dx

## Fundamental Theorem of Calculus:

$$\int_a^b f(x) dx = F(b) - F(a)$$

where  $F(x)$  is  
any anti-derivative  
for  $f(x)$ .

eg.  $\frac{1}{4}x^2 = F(x)$        $F'(x) = \frac{1}{2}x$

$$\int_0^2 \frac{1}{2}x dx = \frac{1}{4}(2)^2 - \frac{1}{4}(0)^2 = \frac{1}{4} \cdot 4 = 1.$$

Notations  $F(b) - F(a) = [F(x)]_a^b = F(x) \Big|_a^b$   
 $= F(x) \Big|_{x=a}^{x=b}$

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### Practice

1.  $\int_{-2}^2 (x^3 - 2x + 3) dx$

3.  $\int \sin 2x dx$

2.  $\int \sin x dx$

4.  $\int \sqrt{1-x^2} dx$   
↑

$$L_n \int \sin x \cos x$$

$$\int_{-1}^1 \sqrt{1-x^2} dx$$

↑  
trick  
question

$$S_n \int \frac{4x^3}{(x^4+2)^2} dx$$

Reminders  $\int x^n dx = \frac{1}{n+1} x^{n+1} + C \quad n \neq -1$

$$\int x^{-1} dx = \int \frac{1}{x} dx = \ln|x| + C$$

$$\int \sin x dx = -\cos x + C$$

$$\int \cos x dx = \sin x + C$$